

hp StorageWorks

Release Notes – HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7A for Novell NetWare

Part Number: AA-RFB8H-TE

Eighth Edition (January 2004)

Product Version: 8.7A

This document contains last-minute and supplemental information about your Solution Software. In the event of conflicting information between these Release Notes and other documents contained in this product release, the Release Notes content takes precedence.

For the latest version of these Release Notes and other product documentation, visit the *StorageWorks* website at:

<http://h18006.www1.hp.com/storage/index.html>



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HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version
8.7A for Novell NetWare
Eighth Edition (January 2004)
Part Number: AA-RFB8H-TE

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Intended Audience

This document is intended for storage administrators and *StorageWorks* customer service personnel who install and maintain *StorageWorks* Enterprise/Modular Storage RAID Array products that include *StorageWorks* HSG80 RAID Array Controllers.

Conventions

The following conventions are used throughout this document:

- Unless otherwise specified, all references to controllers or array controllers imply the *StorageWorks* HSG80 RAID Array Controller.
- Unless otherwise specified, all references to *StorageWorks* Array Controller Software Version 8.7 imply the released *StorageWorks* ACS Version 8.7 code or subsequently patched versions of ACS Version 8.7.
- For the purpose of this document, Enterprise/Modular Storage RAID Array refers to the following *StorageWorks* RAID Array products:
 - RA8000—Fibre Channel RAID Array 8000
 - ESA12000—Enterprise Storage Array 12000 Fibre Channel
 - MA8000—Modular Array 8000 Fibre Channel
 - EMA12000—Enterprise Modular Array 12000 Fibre Channel
 - EMA16000—Enterprise Modular Array 16000 Fibre Channel

Abbreviations and Acronyms

The following abbreviations and acronyms are used throughout this document:

- **ACS**—Array Controller Software
- **CCL**—Command Console LUN
- **CLI**—Command Line Interpreter
- **EISA**—Extended Industry Standard Architecture
- **EMU**—Environmental Monitoring Unit
- **EVA**—Enterprise Virtual Array
- **FC**—Fibre Channel
- **FC-AL**—Fibre Channel - Arbitrated Loop
- **FC-SW**—Fibre Channel - Switched
- **FRU**—Field-Replaceable Unit
- **HBA**—Host Bus Adapter
- **LUN**—Logical Unit

- **LVD**—Low Voltage Differential
- **NVRAM**—Non-Volatile Memory
- **PCMCIA**—Personal Computer Memory Card Industry Association
- **PVA**—Power Verification and Addressing Assembly
- **RAID**—Redundant Array of Independent Disks
- **RETMA**—Radio Electronics Television and Manufacturing Association
- **SAN**—Storage Area Network
- **SBB**—Storage Building Block
- **SCSI**—Small Computer System Interface
- **SMART**—Self-Monitoring Analysis and Reporting Technology
- **SWCC**—*StorageWorks* Command Console
- **VCS**—Virtual Controller Software
- **WWID**—World Wide Identifier
- **WWN**—World Wide Name

Release Package Contents

This HSG80 Fibre Channel Solution Software Kit consists of the following:

- The HSG80 Solution Software documentation set which includes:
 - *HSG80 ACS Solution Software Version 8.7 for Novell NetWare Installation and Configuration Guide*
 - *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*
 - *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*
 - *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*
 - *Command Console Version 2.5 User Guide*
 - *Command Console Version 2.5 Release Notes*
 - *Registration and Warranty Package*
 - *HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7A for Novell NetWare Notes (this document)*

- HSG80 Modular Storage RAID Arrays Solution Software V8.7A for Novell NetWare CD-ROM

- Installation and scripting utilities

- Device drivers

The following supporting documentation is available from the *StorageWorks* website:

<http://h18006.www1.hp.com/storage/index.html>

- *SAN Design Reference Guide*, Part Number: AA-RMPNH-TE
- *Enterprise/Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note*, Part Number: AA-RS1ZA-TE
- *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*, Part Number: EK-SE2C8-UA. C01
- *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*, Part Number: EK-LVDU3-UA. A01
- *Modular Array Cabinet Restrictions*, Part Number EK-MACON-CA. B01

Important Notice Regarding Cache Sizes

For ACS Version 8.7, minimum cache size requirements are 128 MB in unmirrored configurations, and 256 MB in mirrored configurations, per cache module.

The cache size requirements for running ACS Version 8.7P remain at 512 MB.

Identifying ACS Revision Level

The ACS release package you received should include a PCMCIA program card containing the new ACS software. Included in this section are instructions for determining the ACS version running on your RAID Array.

Once ACS is installed, you can identify the specific version of ACS by typing the following command at the CLI prompt:

```
HSG80> SHOW THIS_CONTROLLER
```

The resulting display lists the software revision level as one of the following:

V87G

V87F

V87P

If the ACS version is not Version 8.7 or a subsequently patched version of ACS Version 8.7, contact your support provider for instructions on how to obtain the updated version.

If the ACS version is Version 8.7P, you need additional layered application software beyond this Solution Software Kit to take advantage of the added functionality of these versions. See "Layered Software Applications", page 19, for additional information on compatible layered application software.

ACS Version 8.7 is fully compatible with Version 8.7A Solution Software. In addition, Version 8.7A Solution Software is backward compatible with ACS Version 8.6, which benefits the upgrade process across your SAN.

Patching ACS

Each ACS patch builds on the current version of ACS and all previously installed patches. ACS patches must be installed in order, from lowest to highest, when multiple patches are installed. ACS patches are available for download from the following *StorageWorks* website:

<http://h18000.www1.hp.com/products/storageworks/software/drivers/acs/index.html>

ACS patch downloads come packaged with the instructions and scripts needed to apply the patch. See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for further information on patching ACS.

For multi-bus configurations, use the following procedure in addition to those provided with the ACS patch download:

1. Apply ACS patches to both controllers.
2. Move all units to `OTHER_CONTROLLER`, one unit at a time, using Secure Path software. Moving the units in this manner is not a requirement, but it lets the controller do less work than when moving all the units at once.
3. Reboot `THIS_CONTROLLER` during a slow time (when controllers are running at more than 50% idle). The patch takes effect once the controller is rebooted.
4. Repeat these steps for `OTHER_CONTROLLER` by moving all units to `THIS_CONTROLLER` and rebooting `OTHER_CONTROLLER` during a slow time.

ACS Patch Memory

Any installed ACS Version 8.6 (or lower) patches should be removed after an ACS Version 8.7 installation since they are no longer applicable. This frees up HSG80 patch memory for future ACS patches.

To check or remove ACS patches, run the Code Load and Code Patch utility by typing the following command:

```
HSG80> RUN CLCP
```

New Features

This section briefly describes new features and changes that are supported by the Version 8.7A release of the Solution Software together with the array controller running ACS Version 8.7.

ACS Feature Enhancements

The following major enhancements are included in the ACS Version 8.7 release:

- **Host Connection Table Locking**—Host table lock and unlock commands were added to control the connection table in NVRAM. When the table is locked, the host login request is rejected (unless the connection is already in the table), and the request is stored internally on a rejected hosts table.
- **Selective Management Presentation**—Selective Management Presentation extends the use of Selective Storage Presentation by providing control over which SAN Management Agent systems (if any) can perform management operations.
- **VENDOR_ID Field**—ACS now provides a `VENDOR_ID` field at the bottom of the **Extended information** area, returned by the `SHOW THIS FULL` or `SHOW OTHER FULL` commands.
- **Linked WWIDs for Snap and Clone Units**—To better manage snap and clone unit creation, a linked WWID scheme was implemented. It keeps the WWIDs of these units constant each time they are created. The linked WWID scheme reduces the number of system data records needed to track unit WWIDs, and enhances the stability of administrative scripts used in unit creation.
- **SMART Error Drive Eject**—In prior versions of ACS, SMART error notifications received from a device were treated as soft (recovered) errors. The notification was passed to the host and operations continued. ACS now provides a CLI switch (SMART error eject state) that offers an alternative to this behavior.

With the new switch enabled, drives in a normalized and redundant set that report a SMART error are removed from that set. SMART errors reported by drives in a non-redundant or non-normal set continue to be treated as recovered errors. If the switch is disabled, all SMART errors are treated as recovered errors.

- **Error Threshold for Drives**—ACS now provides the ability to set limits for drive errors. Once the limit is reached, the questionable drive is removed from any redundant set it is a member of and put into the failed set. Errors counted are medium and recovered errors. Hardware errors are not included in this count since the drive fails immediately when a hardware error is encountered.

CLI Command Updates

The following CLI commands and switches were added or enhanced in ACS Version 8.7:

Host Connection Table Locking

```
SET controller CONNECTIONS_LOCKED
SET controller CONNECTIONS_UNLOCKED
ADD CONNECTIONS REJECTED_HOST
```

Selective Management Presentation

```
SET DISABLE_MANAGERS
SET ENABLE_MANAGERS
```

Linked WWIDs for Snap and Clone Units

```
ADD SNAPSHOT_UNITS USE_PARENT_WWID
```

SMART Error Drive Eject

```
SET controller SMART_ERROR_EJECT
```

Error Threshold for Drives

```
CLEAR_ERRORS DRIVE_ERRORS
SET DRIVE_ERROR_THRESHOLD
SHOW DRIVE_ERROR_THRESHOLD
```

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for complete syntax details.

FC Switch Support Updates

The following updates and changes to supported FC Switch products are included in this Solution Software Version 8.7A release:

- Firmware for all 1 Gbps SAN Switch products was upgraded to v2.6.0h.
- Added support for the following FC switches, many of which provide 2 Gbps switch support:
 - SAN Switch 2/16 (16 Ports FC, 2 Gbps)
 - SAN Switch 2/8-EL (8 Ports FC Entry Level, 2 Gbps)
 - SAN Switch 2/16-EL (16 Ports FC Entry Level, 2 Gbps)
 - SAN Switch 2/32 (32 Ports FC, 2 Gbps)
 - SAN Core Switch 2/64 (32-64 Ports FC, 2 Gbps)
 - SAN Director 64 (32-64 Ports FC, 1 Gbps)
 - SAN Edge Switch 32 (32 Ports FC, 1 Gbps)
 - SAN Edge Switch 16 (16 Ports FC, 1 Gbps)
 - SAN Director 2/64 (32-64 Ports FC, 2 Gbps)
 - SAN Director 2/140 (140 Ports FC, 2 Gbps)
 - SAN Edge Switch 2/32 (32 Ports FC, 2 Gbps)
 - SAN Edge Switch 2/16 (16 Ports FC, 2 Gbps)
 - SAN Edge Switch 2/24 (24 Ports FC, 2 Gbps)

See "Switch Support", page 18, for additional information.

IMPORTANT: *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. The best practice is to uniformly upgrade all switches in the SAN.

Solution Software Updates

The following updates were made to your Solution Software:

- Solution Software Version 8.7A was qualified with ACS Version 8.7 and the components defined in these Release Notes.
- Solution Software Version 8.7A no longer supports StorageWorks 32-bit FC HBA 223180-B21 and StorageWorks 64-bit FC HBA 120186-B21.

- StorageWorks Command Console (SWCC) no longer ships with Solution Software. See "Operating Constraints", page 23, for configuration options.

Documentation Updates

The following documentation changes were made in order to consolidate and reduce the number of documents associated with Version 8.7A Solution Software:

- New document *Enterprise/Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note* consolidates prior release, host-specific FC-AL application notes into a single, multivendor document for FC-AL configurations. This document supersedes the following application note:
 - *Enterprise/Modular Storage RAID Array FC-AL Configurations for Novell NetWare Application Note*, Part Number: EK-FCALN-AA D01

The following changes were made to the general content of these Release Notes since they were last published:

- A new section "Abbreviations and Acronyms", page 4 was added to define abbreviations and acronyms used in these Release Notes.
- A new section "Patching ACS", page 7, was added to clarify the process used to patch ACS.
- New "SCSI-2 to SCSI-3 Migration", page 22, information was added to assist customers who wish to extend the interoperability of their SAN.
- The section "Layered Software Applications", page 19, was updated.
- The section "Disk Device Support", page 15, was updated.
- The "Document Catalog" section and procedures were removed because electronic copy for Solution Software documentation is available exclusively from the *StorageWorks* website.
- The "HSG80 Device Removal and Replacement" section and procedures were moved from these Release Notes to the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.
- The "Solution Software Upgrade Procedures" section was moved from these Release Notes to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

Modular Array Solutions

The modular solution consists of the array controller (single or dual configurations) installed in a Model 2200 Ultra SCSI controller enclosure, and the drives installed in either a Model 4314 disk enclosure or a Model 4354 disk enclosure. The modular solutions must be mounted in RETMA cabinets. The *StorageWorks* RETMA cabinets are available in heights of 42U, 41U, 36U, and 22U. The Model 2200 Ultra SCSI controller enclosure is 4U. The Model 4314 disk enclosure and the Model 4354 disk enclosure are both 3U. This combination allows for several cabinet configurations.

NOTE: If you wish to use a controller from an existing RA8000 or ESA12000 storage system, the Cache Bulkhead upgrade for installation of the controller in the Model 2200 is required.

- For information about how to install the array controller in a Model 2200 Ultra SCSI controller enclosure, see the *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*.
- For information about how to install drives in either a Model 4314 disk enclosure or a Model 4354 disk enclosure, see the *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*.
- For information about modular solution configurations and restrictions, see the *Modular Array Cabinet Restrictions* user document.

Disk Enclosures

The array controller firmware addresses up to 14 disks per SCSI bus. The maximum number of disks supported by an array controller (single or cooperating pair) is 84. The disk enclosures can be configured for single bus or for dual bus operation.

NOTE: The 43xx disk enclosures do not allow daisy chaining between shelves.

Table 1: Single Bus Mode Enclosure Options

Disk Enclosures Options/Single Bus Mode	Part Number
Model 4310R—Rack-mountable 10-drive enclosure with single bus, single power supply	174631-B21
Model 4314R—Rack-mountable 14-drive enclosure with single bus, single power supply	190209-001
Model 4314T—Tower mount 14-drive enclosure with single bus, single power supply, LCD monitor	190210-001
Second power supply for 4314 (adds a redundant power supply to the 4314)	119826-B21

Table 1: Single Bus Mode Enclosure Options (Continued)

Single bus I/O module for existing 4314	190212-B21
Dual bus I/O module for existing 4314 (changes the 4314 from a single bus to a dual bus)	119829-B21

Table 2: Dual Bus Mode Enclosure Options

Disk Enclosures Options/Dual Bus Mode	Part Number
Model 4350R—Rack-mountable 10-drive enclosure with dual bus, dual power supply	174630-B21
Model 4354R—Rack-mountable 14-drive enclosure with dual bus, dual power supply	190211-001

NOTE: Use a single bus I/O module to transform a Model 4354 disk enclosure to single bus.

SCSI Cables

SCSI cables must be ordered separately to connect the 43xx shelves to the Model 2200 enclosure. The following SCSI cables are supported.

Table 3: SCSI Cable Options

SCSI Cable Options	Part Number
1-meter SCSI cable	168256-B21
2-meter SCSI cable	168258-B21
3-meter SCSI cable	189505-B21
5-meter SCSI cable	400983-005
10-meter SCSI cable	400983-010

Ordering Modular Storage Systems

The Modular Array/Enterprise Modular Array storage systems can be ordered in one of the following three ways:

- Predefined models are available that provide a set number of controller shelves and drive shelves in a Modular Storage Cabinet:
 - MA8000: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 22U Modular Storage Cabinet
 - EMA12000 D14: Three Model 2200 controller enclosures and nine dual bus Model 4354 disk enclosures in a 42U Modular Storage Cabinet

- EMA12000 S14: One Model 2200 controller enclosure and six single bus Model 4314 disk enclosures in a 36U Modular Storage Cabinet
- EMA12000 Blue: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 41U Modular Storage Cabinet
- EMA16000 S14: Two Model 2200 controller enclosures and twelve single bus 4314 disk enclosures in a 41U Modular Storage Cabinet
- EMA16000 D14: Four Model 2200 controller enclosures with twelve dual bus 4354 disk enclosures in a 41U Modular Storage Cabinet

NOTE: The predefined models require the following options: Controllers, ECBs, Controller firmware and drives.

- Configure-to-Order. Allows you to specify the number of controller shelves and drive shelves desired in a Modular Storage Cabinet.
- Assembly onsite. Allows you to order the components separately and install them in any supported RETMA rack or cabinet.

Hardware and Software Support

This section lists the hardware, devices, and operating system versions that are compatible with this Fibre Channel Solution Software Kit.

Array Hardware Support

The following Enterprise/Modular Storage RAID Array hardware products are supported:

- DS-SW600-AA—600mm wide cabinet 50/60 Hz, dual-redundant controllers, bolting kit for coupling (two SW600 cabinets)
- DS-SW370-AA—RAID pedestal, five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules
- DS-SW370-EA—RAID pedestal; five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules; metric mounting hardware

- DS-BA370-AA—RAID rack mount enclosure; five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box, six single-ended I/O modules; one pedestal user's guide; one enhanced EMU; one PVA, metric mounting hardware
- DS-BA370-MA—Maintenance option for the SW370 and BA370 field service option, FRU
- DS-BA35X-HH—180-watt, 100- to 200-V power supply; 240-V, AC factor-corrected power supply; blue color carrier
- DS-BA35X-MK—High-powered blower for the SW370 and BA370
- DS-BA35X-MP—Termination module
- DS-BA35X-BA—External cache battery shelf for SW370
- DS-BA35X-BC—Single battery in blue SBB
- DS-BA35X-BD—Double battery in blue SBB
- DS-BA35X-EB—Enhanced Environmental Monitor Unit of the SW370 and BA370
- DS-BA35X-MN—Single-ended, Ultra SCSI I/O module
- DS-BA35X-EC—Power verification and addressing module
- HS35X-BA—Single external cache battery in an SBB
- HS35X-BD—Dual external cache battery in an SBB
- DS-HSDIM-AB—64 MB cache upgrade for HSX80
- DS-HSDIM-AC—256 MB cache upgrade for HSX80

Disk Device Support

This Fibre Channel Solution Software Kit supports the disk devices listed in Table 4 at the indicated hardware and microcode levels.

NOTE: Full 14-slot drive support per channel is available on MA/EMA Series arrays only.

IMPORTANT: New Universal Disk Drives (or units that are migrated from SmartArray controllers usage) being configured into storageset members need to be initially written to with DILX (a diagnostic utility on HSG storage systems). DILX only operates on units. Therefore, the new disks must be configured into a unit prior to running DILX.

Table 4: Supported Disk Drives

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
176494-B21	BC072638A2	72.8	10,000	BDC7	A01
232432-B22	BD07264546			B209	
	BD0726459C			B008	
	BD0726536C			3B02	
232916-B22	BF03664664	36.4	15,000	3B06	A01
	BF03665223			B003	
176496-B22	BD0366349C	36.4	10,000	3B02	A01
	BD036635C5			B020	A05
	BD03663622			BDC4	A01
	BD03664545			B209	
	BD03664553			3B04	
	BD0366459B			B005	
	BD0366536B			3B02	
127968-001	DS-RZ1FC-VW	36.4	10,000	3B02/2B07/ B020/BDC4	A01
147533-001	DS-RZ1FB-VW	36.4	7,200	N1H1/0372/ 1614/3B05	A01
188122-B22	BF01863644	18.2	15,000	3B01	A01
	BF01864663			3B06	
	BF01865222			B003	
128418-B22	BD018122C9	18.2	10,000	B016	A01

Table 4: Supported Disk Drives (Continued)

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
142673-B22	BD01862A67	18.2	10,000	B007	A01
	BD01862376			BCJE	
	BD018635C4			B020	
	BD01864544			B209	
	BD01864552			3B04	
	BD0186459A			B008	
	BD0186349B			3B07	
380589-B21	DS-RZ1ED-VW	18.2	10,000	0306/1614/ 3B07/B020/ BDC4	A01
388144-B22	BB01811C9C	18.2	7,200	3B05	A01
147598-001	DS-RZ1EA-VW	18.2	7,200	N1H1/0306/ 3B05	A01
380694-B21	DS-RZ1EF-VW	18.2	7,200	0372/N1H1	A01
188120-B22	BF00963643	9.1	15,000	3B01	A01
328939-B22	BD009122BA	9.1	10,000	3B07	A01
142671-B22	BD00962373	9.1	10,000	BCJE	A01
	BD00962A66			B007	
	BD009635C3			B020	
380588-B21	DS-RZ1DD-VW	9.1	10,000	0306/1614/ 3B07/B020	A01
123065-B22	BB00911CA0	9.1	7,200	3B05	A01
147597-001	DS-RZ1DA-VW	9.1	7,200	N1H1/3B05/ B020	A01
380595-B21	DS-RZ1DF-VW	9.1	7,200	0372/N1H1/ 1614	A01

Table 4: Supported Disk Drives (Continued)

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
380693-B21	DS-RZ1DB-VW	9.1	7,200	LYJ0/0307	A01
N/A	DS-RZ1CD-VW	4.3	10,000	0306	A01
N/A	DS-RZ1CB-VW	4.3	7,200	LYJ0/0656	A01
380691-B21	DS-RZ1CF-VW	4.3	7,200	0372/N1H1/1614	A01

Switch Support

This Fibre Channel Solution Kit supports the Fibre Channel switches and firmware versions listed in the HP StorageWorks SAN Design Reference Guide at <http://h18000.www1.hp.com/products/storageworks/san/documentation.html>.

IMPORTANT: *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. It is considered best practice to uniformly upgrade all switches in the SAN.

System Components

This Fibre Channel Solution Software Kit supports the system components and operating system versions listed in Table 5.

Table 5: Minimum System Requirements

Component	Requirement
Controller Compatibility	<i>StorageWorks</i> HSG80 Array Controller, ACS Version 8.7F (or a subsequently patched version of ACS Version 8.7F) NOTE: This Solution Software is backward compatible with ACS Version 8.6, but only for the purpose of performing upgrades to the ACS firmware. <i>StorageWorks</i> does not recommend mixing ACS versions in the same SAN.
Platform	Intel and ProLiant X86 Servers
Operating System	Novell NetWare V5.1, NetWare Cluster Server V1.01 Novell NetWare V6.0, NetWare Cluster Server V1.06
Topology	Fibre Channel Switched (FC-SW) Fibre Channel Arbitrated Loop (FC-AL)
SCSI Protocol	SCSI-2 SCSI-3 (recommended)

Table 5: Minimum System Requirements (Continued)

Failover Mode	Transparent (all supported OS versions) Multi-Bus (NetWare V5.1 and V6.0 only, requires Secure Path software)
Host Mode	NETWARE
Disk Space	5 MB
Adapter Compatibility	<i>StorageWorks</i> 64-bit, 2Gb PCI-X FC HBA 281540-B21 (3R-A3750-AA) FCA2210, HBA driver V6.51b, Firmware Version 1.18.4/BIOS 1.34

Secure Path Software

Secure Path is a high availability, multi-bus software application that supports FC-AL and FC-SW connectivity. This Fibre Channel Solution Software Kit supports the Secure Path software shown in Table 6.

Table 6: Secure Path Compatibility

Operating System	Supported Product Version
NetWare V5.1 and V6.0	Version 3.0C

NOTE: For more information on Secure Path software, see the product documentation that comes with the product, or visit the *StorageWorks* website:

<http://h18006.www1.hp.com/products/sanworks/secure-path/index.html>

Layered Software Applications

Compatibility with *StorageWorks* layered software applications is defined in Table 7.

Table 7: Layered Application Compatibility

Application	Version	Supported ACS Variants
Data Replication Manager (DRM)	Version 8.7P	Version 8.7P
Storage Resource Manager (SRM)	Version 4.0B	Version 8.7F
Network View	Version 2.0B	Version 8.7F/G/P
Management Appliance	Version 1.0C	Version 8.7F/P

In cases where ACS functional builds other than Version 8.7F are required, ensure that all necessary components for those configurations are at the proper level prior to upgrading your ACS code.

NOTE: DRM is supported on Novell NetWare Version 5.1 and 6.0 only.

For more information on these and other Storage Management software, see the product documentation that comes with the product, or visit the following *StorageWorks* website:

<http://h18006.www1.hp.com/storage/software.html>

ACS Feature Support

The following sections provide details for specific ACS features.

Maximum Host Connections

The maximum number of host connections is 96 for the table of known connections. A connection is unique to the node WWN, port WWN, and controller port. This table is maintained in the NVRAM of the controller. If the table contains 96 entries, new connections cannot be added unless unused entries are deleted. Otherwise, a host attempting FC login is rejected from becoming a connection into the connection table, but not necessarily from the fabric.

Rolling Upgrades

The ACS upgrade path has been reworked to provide a more friendly and seamless operation. However, the documented process must be followed carefully to ensure a smooth transition. For more information on upgrade and downgrade procedures, refer to the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.

ACS Version 8.7 supports both the dual-redundant controller rolling upgrade and dual-redundant controller shutdown upgrade methods. The rolling upgrade method allows the host system to continue I/O activity, with minimal impact, while each controller is upgraded. The shutdown upgrade method takes the storage devices offline for a period of time while the software is upgraded simultaneously on both controllers.

Before initiating an ACS rolling upgrade, please refer to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* for additional instructions. These procedures include consideration for Solution Software, Secure Path Software and switch firmware, as well as controller-based upgrade. Specific instructions for the Solution Software and the proper sequence for all components is included.

NOTE: Rolling upgrades from ACS Version 8.5 (or earlier) to ACS Version 8.7 are not supported. In these cases, a shutdown upgrade is required.

IMPORTANT: For ACS Version 8.7, minimum cache size requirements are 128 MB in unmirrored configurations, and 256 MB in mirrored configurations, per cache module. The cache size requirements for running ACS Version 8.7P remain at 512 MB.

Disk Partitioning

ACS allows partitioning of disk drives or storagesets for improved device management. A partition appears to the operating system as a single virtual disk. Up to eight partitions may be created per storageset or disk drive. Disk partitioning is supported under all failover modes supported by your operating system.

Write History Logging

Write history logging, available to users of ACS Version 8.7P, uses a log unit to log a history of write commands and data from the host on the initiator side in either of the following situations:

- The target is inaccessible.
- The initiator site data needs to be synchronized during a planned failover.

Mini-merge—If the target becomes inaccessible, the writes that would have gone to the target are logged to the association set's assigned log unit. An inaccessible target in this context refers to both links or target controllers shutting down. When the target becomes accessible, a full copy is not necessary. Only those host writes that occurred while the links were down are reissued. This is referred to as a *mini-merge*. If a full copy was in progress at the time of the disconnect, write history logging is not initiated and the full copy is restarted when the target is accessible again.

Fast-Failback—During a planned failover, if write history logging was enabled at the target site, then when the failback is performed, the initiator site is synchronized through a process called *fast-failback*. The writes that would have gone to the initiator are logged to the association set's log unit. Only those writes that occurred since the failover are reissued. A full copy is not necessary.

Dynamic Volume Expansion

Dynamic Volume Expansion is not supported on NetWare. However, NetWare provides its own dynamic volume expansion features. Please see your NetWare documentation for details.

Configuration Rules

The following list defines maximum configuration rules for the controller:

- 128 visible LUNs/200 assignable unit numbers
 - In SCSI-2 mode, if the CCL is enabled, the result is 127 visible LUNs and one CCL.
 - In SCSI-3 mode, if the CCL is enabled, the result is 126 visible LUNs and two CCLs.
- 1.024 TB storage set size
- 96 host connections
- 84 physical devices
- 20 RAID 3/5 storage sets
- 30 RAID 3/5 and RAID 1 storage sets (see Note)
- 45 RAID 3/5, RAID 1, and RAID 0 storage sets (see Note)

NOTE: For the previous two storage set configurations, this is a combined maximum, limited to no more than 20 RAID 3/5 storage sets.
- 8 partitions of a storage set or individual disk
- 6 physical devices per RAID 1 storage set (mirror set)
- 14 physical devices per RAID 3/5 storage set (RAID set)
- 24 physical devices per RAID 0 storage set (stripe set)
- 45 physical devices per RAID 0+1 storage set (striped mirror set)

SCSI-2 to SCSI-3 Migration

In order to extend interoperability within the heterogeneous SAN, *StorageWorks* highly recommends that customers begin migrating from SCSI-2 to SCSI-3 protocols. Moving to SCSI-3 allows greater diversity in the operating systems and storage products (including EVA) that comprise a SAN.

All migrations from SCSI-2 to SCSI-3 should be planned during scheduled downtime. SCSI migrations require a controller restart and most likely a server restart. Data contained on CCL units needs to be moved to new units once SCSI migration is complete.



CAUTION: Before attempting a SCSI-2 to SCSI-3 migration, it is extremely important that all data be backed up and that units be available for remapping CCL data. In addition, ensure that all redundant storagesets are in normal (non-reduced) mode.

When migrating from SCSI-2 to SCSI-3, the controller checks for controller unit D0 and does not change modes until D0 (at all presented offsets) is deleted. One or more LUNs are lost after the mode change. If you are planning to move from SCSI-2 to SCSI-3, back up your data first. The data in LUN 0 (and any other offsets that map to LUN 0) that was used in SCSI-2 requires that the data be moved to a different LUN. It may be necessary to retrieve this data from a backup.

IMPORTANT: If multi-bus failover configurations or server clustering are employed in the environment, there may be additional considerations regarding CCL usage during SCSI migration procedures. Please see your multi-bus failover or server clustering documentation prior to implementation.

In addition, there may be OS-based limitations on SCSI-3 usage to consider, particularly in down-level versions of your OS. Please review your OS documentation prior to migration.

For more information, see the “What is the Command Console LUN?” and “Assigning Unit Numbers Depending on SCSI_VERSION” sections of Chapter 1 in the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

Operating Constraints

This section describes the operating constraints for ACS Version 8.7. An operating constraint is a limitation placed on the operation of the controller. Other constraints on host adapters or other system components may also apply. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller. See the documentation that came with your host server for more details.

Controller Configuration with NetWare

StorageWorks Command Console (SWCC) provides a graphical user interface that can be used to configure and monitor your storage system. Use of SWCC is recommended, but not required. Solution Software Version 8.7A for NetWare no longer ships with SWCC but the controller can be configured in other ways. There are three options available for configuring HSG80 controllers on NetWare:

- Access the CLI utility through the serial port and execute CLI commands needed for configuration. See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* included with this kit for configuration commands.

- Access SWCC on a Windows NT server that is in the same SAN as your NetWare server. To download the Windows kit, go to the following website:
<http://h18006.www1.hp.com/products/storageworks/ma8kema12k/softwaredrivers.html>.
- Install HSG Element Manager. To learn more about this management software solution, visit the following website:
<http://h18006.www1.hp.com/products/sanworks/managementappliance/index.html>.

External Cache Battery

StorageWorks recommends that you replace the External Cache Battery (ECB) every two years to prevent battery failure.

If you are shutting down your controller for longer than one day, complete the additional steps in “Shutting Down the Subsystem” in the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*. This prevents the ECB from discharging during planned power outages.

Dual External Cache Battery Failures

The array controller cache policy provides for proper handling of a single ECB failure as described in the *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*. For dual ECB failures, it states that no failover occurs. For this release, if a dual ECB failure is detected, both controllers are restarted.

Using FRUTIL to Insert a New Controller

When using FRUTIL to insert a new controller in a dual-redundant controller configuration, you see a new set of instructions after the new controller was inserted:

If the other controller did not restart, follow these steps:

1. Press and hold the **Reset** button on the other controller.
2. Remove and re-insert the program card for the other controller.
3. Release the **Reset** button.

NOTE: Whenever you are running FRUTIL you must quiesce all I/O.

FRUTIL Limitation

This limitation applies to users of ACS Version 8.7P with DRM only.

FRUTIL cannot be run in remote copy set environments on the target side specifically when I/O is in progress.

If the host load was stopped, you can run FRUTIL on the initiator or target. If the host load is not quiesced and FRUTIL is run while remote copy I/O is running, the normalization process is reset.

Saving Your Configuration

When enabled, the `SAVE_CONFIGURATION` function allows you to do the following (supported on single controller configurations only):

- Save a configuration to a disk or storage set. The configuration may be retrieved later and downloaded onto a replacement controller.
- Retain code patches to the ACS software.

Saving a Configuration to Previously Initialized Storage Sets

If any storage set within the configuration was previously initialized with the `INITIALIZE container-name SAVE_CONFIGURATION` command to save your configuration to disk, it is not necessary to reconfigure your devices with a new controller. `SAVE_CONFIGURATION` also retains code patch information to the software. This option is supported on single controller configurations only.

ACS Version 8.7 saves any installed software patches on disks initialized with the `SAVE_CONFIGURATION` command. To replace a controller and restore the configuration from a disk, you do not have to reinstall any software patches.

Configuration information cannot be retrieved from storage sets created on other HSx controllers (for example, HSD, HSJ, or HSZ controllers). You can only restore a configuration from a configuration saved on this or another HSG80 array controller.

Avoiding Problem Situations

Under certain conditions, you may experience unusual array controller behavior. This section presents information to help you avoid such situations and to recover from them if they occur.

Adding, Moving, and Changing Devices

The array controller maintains a configuration map of device types and locations. This map is used to communicate with devices. If you add, move, or change a device while the array controller is powered off without first changing the array controller configuration, the array controller is not able to communicate with the changed device when it returns to service.

If a device is removed by mistake while the array controller is off, delete all containers associated with the removed device after power was restored to the array controller.

If a device is replaced while the array controller is off, install the replacement device before restoring power to the array controller. Once power is restored, use the `DELETE DISK` CLI command to remove the disk from the configuration. Then use the `ADD DISK` CLI command to add the new device. This correctly removes the failed device and adds the new device after restoring power to the array controller.

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for details on CLI command usage and syntax.

See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for correct device removal and addition procedures.

Moving StorageSets

Move only *normal* storageSets. Do not move storageSets that are *reconstructing* or were *reduced*.



CAUTION: Ensure all storageSets are in *normal* mode prior to moving them, or data corruption occurs.

Replacing Array Controllers, Cache Modules, or External Cache Battery Storage Building Blocks

You can replace the array controller, cache module, or external cache battery (ECB) storage building block (SBB) while the storage system is shut down. However, you must enter the `SHUTDOWN THIS_CONTROLLER` command prior to shutting down the storage system in order to make configuration changes. If two array controllers are configured in a dual-redundant configuration, you must first enter the `SHUTDOWN OTHER_CONTROLLER` command.

These commands instruct the array controllers to flush all unwritten data from the cache modules and discontinue all I/O activity. For more information regarding the `SHUTDOWN` controller command, see the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*. For information on maintenance and replacement of the array controller, cache module, and external cache battery, see the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.

Unit Offsets

Setting unit offsets requires a bus rescan (scan for devices) and deletion of any hardware paths still showing `NO_HW` status from the prior connection offsets for the newly set offsets to take effect.

Establishing an SWCC SCSI Connection

SWCC is not supported when Secure Path is installed on the servers and/or if more than one FCA2210 HBA is installed in the system. For SWCC to connect to an array, a LUN must be configured using CLI commands. *StorageWorks* recommends that LUN 0 or LUN 100 not be used. In certain instances, if LUN 0 is used, LUNs with IDs greater than D50 or D150 will not be recognized.

NOTE: In transparent failover mode, LUN D100 should not be used.

Host Operating System Notes

The following section lists host-specific operating notes.

Host Operating System Support of Multi-Bus Failover

Multi-bus failover is supported on the Novell NetWare operating system through the use of Secure Path software. See "Secure Path Software", page 19, for version compatibility and restrictions.

Virtual Disk Wizard in Multi-Bus Failover Mode

When creating a virtual disk using the SWCC Virtual Disk Wizard, in Step 4 of that process, the default value for host access is "none." You must change this value to one of the host names provided; otherwise, the virtual disk you have just added will be inaccessible.

NOTE: Virtual Disk Wizard in multi-bus failover mode is not supported with the Secure Path driver.

Mounting a CLONE

Before mounting a CLONE, make sure you move it to another system. Having two identical NetWare Volume Names on the same system can cause problems. NetWare does not allow you to mount a SNAPSHOT on the same server that hosts the original volume. NetWare views the SNAPSHOT as a software mirror of the original volume and does not allow you to mount both copies on the same server. The SNAPSHOT can only be mounted on another NetWare server.

Cluster Configurations

If using an array in a cluster configuration, leave 5 MB free on one array for cluster configuration information.

SCSI-2 Configurations

Do not use LUN 0 with Novell NetWare in multi-bus failover mode. Do not use LUN 0 or LUN 100 with Novell NetWare in transparent failover mode.

SCSI-3 Mode

SCSI-3 Mode is now supported under NetWare.

NSS Partitions

NSS partition creation is supported by this Solution Software under NetWare.

Documentation Anomalies

- All references to StorageWorks Command Console (SWCC) in the *HSG80 ACS Solution Software Version 8.7 for Novell Netware Installation and Configuration Guide* are no longer valid. SWCC no longer ships with the HSG80 Modular Storage RAID Arrays Solution Software V8.7A. Refer to "Controller Configuration with NetWare", page 23, for replacement options.